

IN THE CLAIMS:

Please amend the claims as follows:

1. (Currently Amended) Method for the treatment of materials, in particular waste materials and refuse, in which the material to be treated and a combustion supporter comprising oxygen and recycled gases are supplied to an oxidation chamber or combustion reactor, and gases produced during the oxidation or combustion of the above-mentioned material are discharged from the oxidation chamber or combustion reactor, ~~characterized in that~~ wherein the material to be treated, which is introduced into the oxidation chamber or combustion reactor, and the products resulting from the oxidation or combustion are subjected to conditions of isothermy or quasi-isothermy at high or very high temperature, without substantial oxygen deficit, in any part of the chamber or reactor, wherein the oxidation chamber or combustion reactor is operated at a pressure from greater than atmospheric pressure to 600 kPa, and wherein water is injected into the recycled gases to raise the concentration of water in the recycled gases to higher than 30% by volume.

2. (Currently Amended) Method for the treatment of materials according to Claim 1, further comprising ~~characterized in that it comprises~~ the supply of a combustion supporter comprising oxygen mixed with gases resulting from the combustion, with water, or with a combination of gases and water, to bring about a high degree of opacification of the combustion supporter and to ensure almost instantaneous heating of the combustion supporter that is supplied into the reactor.

3. (Currently Amended) Method for the treatment of materials according to Claim 2, wherein ~~characterized in that~~ the recirculation gases resulting

from combustion are supplied at minimized flow-rate and/or temperature so as to minimize the overall volume of gas in the reactor for a ~~given time spent~~ gas residence time in the reactor ~~by the gases~~ and to ensure the removal of the reaction heat from the reactor.

4. (Currently Amended) Method for the treatment of materials according to Claim 2, ~~characterized in that~~ wherein the mixing of the oxygen with the combustion fumes takes place with a concentration of the latter of more than 10% by volume and preferably more than 60% by volume.

5. (Cancelled)

6. (Currently Amended) Method for the treatment of materials according to Claim 2, ~~characterized in that~~ wherein the recirculation gases which ensure the thermal balance of a plant that is operated continuously by removing the excess reaction heat owing to an appreciable ~~heat~~ enthalpy difference between the input and the output of the reactor are recycled at the minimum temperature that is compatible with normal cooling means and preferably just above the dew point.

7. (Currently Amended) Method for the treatment of materials according to Claim 2, ~~characterized in that~~ wherein the recycling gases which ensure the thermal balance are constituted wholly or partially by steam.

Claims 8-9. (Cancelled)

10. (Currently Amended) Method for the treatment of materials according to Claim 1, ~~characterized in that~~ wherein the substances which cannot be gasified inside the reactor are immediately fused in the reactor by virtue of the high rate of heating of the combustible material, in particular of its solid fraction, so as to reduce

considerably to negligible value the fraction of dust that is entrained out of the reactor with the burnt gases.

11. (Currently Amended) Method for the treatment of materials according to Claim 1, ~~characterized in that~~ wherein the fused slag is cooled and solidified into beads so as to ensure that toxic heavy metals contained in the incombustible slag are rendered completely inert.

12. (Currently Amended) Method for the treatment of materials according to Claim 1, ~~characterized in that~~ further comprising it ~~comprises~~ a MIMO (multiple input/multiple output) control and optimization procedure which is focused on the parameters at the output of the reactor and in particular on the measurement of data ~~relating to the composition of the gases~~ gas composition at the output of the reactor.

13. (Currently Amended) Method for the treatment of materials according to Claim 12, ~~characterized in that~~ wherein the measurements of the gas-composition data are implemented with characteristic response times of about 2 seconds.

14. (Currently Amended) An apparatus Plant for the treatment of materials, in particular waste materials and refuse, comprising an oxidation chamber or combustion reactor to which the material to be treated can be supplied and which includes an input for a combustion supporter comprising oxygen and recycled gases, and an output for the gases produced during the oxidation or combustion of the above-mentioned material inside the chamber or reactor characterized in that the oxidation chamber or combustion reactor is substantially isothermic or quasi-isothermic in use at high or very high temperature, and without substantial oxygen deficit, in all of its parts,

wherein the oxidation chamber or combustion reactor is operated at a pressure from greater than atmospheric pressure to 600 kPa, and wherein water is injected into the recycled gases to raise the concentration of water in the recycled gases to higher than 30% by volume.

15. (Currently Amended) An apparatus Plant for the treatment of materials according to Claim 14, ~~characterized in that~~ wherein the walls of the reactor comprise a ceramic lining material which participates in the isothermy or quasi-isothermy of the reactor.

16. (Currently Amended) An apparatus Plant for the treatment of materials according to Claim 14, ~~characterized in that it comprises~~ further comprising means for cooling the gases produced during combustion, means for withdrawing and recycling a portion of the said cooled gases being provided for mixing the oxygen at the input to the reactor and producing a combustion-supporting mixture which is opaque to infra-red.

17. (Currently Amended) An apparatus Plant for the treatment of materials according to Claim 16, ~~characterized in that~~ wherein the cooling means comprise means for recovering energy ~~by the giving up of heat by~~ from a high enthalpy value of the gases output from the reactor.

18. (Currently Amended) An apparatus Plant for the treatment of materials according to Claim 16, ~~characterized in that it comprises~~ further comprising means for mixing a portion of the recycled gases with the gases output from the reactor prior to ~~their~~ entry of the gases into the cooling means.

Claims 19-20. (Cancelled)

21. (Currently Amended) An apparatus Plant for the treatment of materials according to Claim 14, ~~characterized in that it comprises~~ further comprising a plurality of feeders for supplying different materials to the reactor, in particular, solid materials in pieces, granular materials, liquid or sludgy materials, and/or gaseous materials.

22. (Currently Amended) An apparatus Plant for the treatment of materials according to Claim 21, ~~characterized in that it comprises~~ further comprising at least one propulsion chamber for the pressurized and discontinuous supply of solid materials in pieces into the reactor.

23. (Currently Amended) An apparatus Plant for the treatment of materials according to Claim 22, ~~characterized in that~~ wherein the propulsion chamber comprises a duct for the supply of gas under pressure, withdrawn from the output line.

24. (Currently Amended) An apparatus Plant for the treatment of materials according to Claim 14, ~~characterized in that~~ wherein the reactor comprises a base portion communicating with and inclined towards a heated duct for collecting fluid slag.

25. (Currently Amended) An apparatus Plant for the treatment of materials according to Claim 24, ~~characterized in that~~ wherein the collecting duct communicates with a container for collecting the liquid fluid slag which is cooled rapidly in a water bath with the formation of solid beads so as to form a very dilute ~~sludge in~~ water slurry.

26. (Currently Amended) An apparatus Plant for the treatment of materials according to Claim 24, ~~characterized in that~~ wherein the collecting duct comprises heating means for keeping the slag fluid.

27. (Currently Amended) An apparatus Plant for the treatment of materials according to Claim 14, ~~characterized in that it comprises~~ further comprising sensor means for measuring output parameters of the reactor, a control and management system receiving the signals of the sensor means in order substantially to improve the number of effective predictions for intervention in the operating conditions of the plant and to control fluctuations due to the non-homogeneity of the materials that are supplied into the reactor.

28. (Currently Amended) An apparatus Plant for the treatment of materials operating in accordance with the method according to Claim 1.